OU Math Day 2010

Algebra 1 Test

(with answers on the last page)

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1. If $3y - 1 = 1 - 2y$ then y equals

   (A) $-\frac{2}{5}$ (B) $\frac{2}{5}$ (C) $\frac{5}{2}$ (D) $-\frac{5}{2}$ (E) None of the above

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2. The grade in a certain course is determined by averaging a student's scores on four examinations. If a student scores 85, 86 and 93 on the first three exams, what must she score on the last exam in order to earn a course grade of 90?

   (A) 91 (B) 93 (C) 96 (D) 97 (E) None of the above

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3. Of the integers listed below which is closest in value to the square root of 2010?

   (A) 142 (B) 71 (C) 45 (D) 14 (E) 35

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4. How many real solutions for x does the equation $x^2 = -9$ have?

   (A) 0 (B) 1 (C) 2 (D) 4 (E) None of the above

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5. The expansion of $(2 - x)^3$ as a degree 3 polynomial is

   (A) $8 - 4x - 2x^2 + x^3$ (B) $8 - 8x + 4x^2 - x^3$ (C) $8 - 12x + 6x^2 - x^3$
   (D) $1 - 3x + 3x^2 - x^3$ (E) None of the above

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6. Which of the five listed numbers is largest?

(A) $\frac{12}{21}$ (B) $\frac{1/12}{21}$ (C) $\frac{12}{1/21}$ (D) $\frac{1/12}{1/21}$ (E) 1

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7. Which of the five listed numbers is smallest?

(A) $\frac{12}{21}$ (B) $\frac{1/12}{21}$ (C) $\frac{12}{1/21}$ (D) $\frac{1/12}{1/21}$ (E) 1

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8. Three less than eight times a number is two more than six times the number. What is the number?

(A) 13 (B) 5/2 (C) 18 (D) $-1/2$ (E) None of the above

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9. Find the least common multiple of 2010 and 2013.

(A) 3 (B) 4023 (C) 1348710 (D) 4046130 (E) None of the above

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10. Find the numerator of the fraction obtained by writing the rational number $\frac{1}{2010} + \frac{1}{2013}$ in reduced form.

(A) 4023 (B) 2 (C) 449570 (D) 1341 (E) None of the above

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11. Simplify the expression $\dfrac{4-(7-(-9))}{6(3+(-2))}$

(A) -2 (B) 2 (C) 1 (D) -1 (E) None of the above

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12. A total of 969 digits are required to write out the first N positive integers (that is, the integers starting with 1 and ending with N). What is the value of N?

(A) 260 (B) 261 (C) 359 (D) 422 (E) None of the above

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13. A factorization of $2x^2 - 13x + 15$ is

(A) $(2x-3)(x-5)$ (B) $(2x-3)(x+5)$ (C) $(2x+3)(x-5)$
(D) $(2x+3)(x+5)$ (E) None of the above

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14. If the three points $(3, 11)$, $(-1, 3)$ and $(x, 9)$ are collinear then find the value of x

(A) -2 (B) 2 (C) -1 (D) 4 (E) None of the above

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15. Find the sum of all of the integer solutions of the inequality $|x-1| < 5$.

(A) 0 (B) 7 (C) 9 (D) 13 (E) None of the above

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16. Determine the coefficient of the x^3y^2z term when $(x+y+z)^6$ is expanded as a degree 6 polynomial.

(A) 60 (B) 30 (C) 90 (D) 15 (E) None of the above

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17. The fifth power of a number equals ten billion. What is the number?

(A) 100 (B) 1000 (C) 10^5 (D) 1000000 (E) None of the above

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18. Determine the number of integers from 1 to 1000 inclusive which are not divisible by 7.

(A) 858 (B) 852 (C) 148 (D) 142 (E) None of the above

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19. For some positive integer k, the number of integers from 1 and k inclusive which are not divisible by 7 equals 1000. What is k?

(A) 1168 (B) 1166 (C) 1096 (D) 2010 (E) None of the above

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20. How many real solutions does the equation $|1 - 5x| = x^2 + 1$ have?

(A) 0 (B) 1 (C) 2 (D) 3 (E) None of the above

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21. Tim's age is twice that of Brian's while Sally's age is half of Brian's. In 14 years the sum of their ages will be 63 which will be the age of their Uncle John at that time. What is the sum of Tim, Brian, Sally and Uncle John's current ages?

(A) 21 (B) 42 (C) 70 (D) 84 (E) None of the above

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22. Determine the smallest positive integer which has a remainder of 1 when divided by 5, a remainder of 2 when divided by 6 and a remainder of 3 when divided by 7.

(A) 312 (B) 836 (C) 626 (D) 416 (E) None of the above

ANSWERS:

1. B
2. C
3. C
4. A
5. C
6. C
7. B
8. B
9. C
10. E
11. A
12. C
13. A
14. B
15. C
16. A
17. A
18. A
19. B
20. E
21. C
22. E